REMARKS

Prior to the present response, claims 28-31 were pending in the present application, and remain in the present application after the present response. In the Office Action dated July 26, 2005, the Examiner has ***finally rejected*** claims 28-31 pending in the application on the basis of new ground(s) of rejection. For the reasons that follow, Applicants respectfully request reconsideration and withdrawal of the finality of the rejection in the Office Action dated July 26, 2005, and allowance of all pending claims 28-31.

A good and sufficient reason why the present response is necessary and was not earlier presented is that the Examiner has relied on new grounds of rejection, relying for the first time on a combination of U.S. patent number 6,271,127 B1 to Liu et al. (hereinafter "Liu") and U.S. patent number 6,110,842 to Okuno et al. (hereinafter "Okuno"). The new grounds of rejection are for the first time brought to Applicants' attention by means of the present ***final rejection*** dated July 26, 2005. Applicants believe that it would be manifestly unfair for the Patent Office not to withdraw the finality of the present rejection and not to consider Applicants' arguments which are necessitated due to new grounds of rejection. As such, a good and sufficient reason exists, as required by 37 CFR §1.116(c), for considering Applicants' present response, withdrawing the finality of the present Office Action, and allowing the pending claims.

A. Rejection of Claims 28-31 under 35 USC §103(a)

The Examiner has rejected claims 28-31 under 35 USC §103(a) as being unpatentable over U.S. patent number 6,110,842 to Okuno et al. (hereinafter "Okuno") in view of Liu. For the reasons discussed below, Applicants respectfully submit that the present invention, as defined by independent claim 28, is patentably distinguishable over Okuno and Liu, either singly or in combination thereof.

The present invention, as defined by independent claim 28, recites, among other things, covering a first area of a dielectric layer, where the dielectric layer has a first dielectric constant, exposing a second area in the dielectric layer to a dielectric conversion source so as to increase the first dielectric constant of the dielectric layer in the second area to a second dielectric constant, and etching a plurality of capacitor trenches in the second area in the dielectric layer. As disclosed in the present application, a first area of a dielectric layer, which has a first dielectric constant, is covered, for example, with photoresist, to prevent the first area of the dielectric from being exposed to a dielectric conversion source while a second are of the same dielectric layer is exposed to the dielectric conversion source.

As disclosed in the present application, as a result of exposure to the dielectric conversion source, the second area of the dielectric layer now has a second dielectric constant that is greater than the first dielectric constant. By converting the dielectric constant of the unexposed first area of the dielectric layer to a higher dielectric constant, the present invention advantageously achieves an increase in the capacitance of the

second area of the dielectric layer compared to the capacitance of the first area (i.e. the covered area) of the dielectric layer. As disclosed in the present application, a plurality of capacitor trenches can be etched in the second area of the dielectric layer and filled with metal to form a composite capacitor. Thus, the present invention advantageously achieves an area of low capacitance for digital circuits adjacent to area of high capacitance density for analog circuits including a composite capacitor.

In contrast to the present invention as defined by independent claim 28, Okuno does not teach, disclose, or suggest covering a first area of a dielectric layer, where the dielectric layer has a first dielectric constant, exposing a second area in the dielectric layer to a dielectric conversion source so as to increase the first dielectric constant of the dielectric layer in the second area to a second dielectric constant, and etching a plurality of capacitor trenches in the second area in the dielectric layer. Okuno is directed to forming integrated circuits having multiple gate oxide thicknesses. See, for example, the Abstract of Okuno. Okuno specifically discloses forming mask 12 to cover portion 14 of substrate 10 where a thicker gate oxide is desired and leaving portion 16 of substrate 10 uncovered where a thinner gate oxide is desired. See, for example, column 3, lines 48-51 and Figure 1A of Okuno.

In Okuno, a high density plasma nitridation process is then performed to form nitride layer 18 on uncovered portion 16 of substrate 10. See, for example, column 3, lines 55-56 and Figure 1B of Okuno. In Okuno, after an oxidation step, thinner oxide layer 20a is formed below nitride layer 18 (which retards oxidation) and thicker oxide

layer 20b is formed where nitride layer 18 is not present. See, for example, column 4, lines 11-15 and Figure 1C of Okuno. However, in Okuno, the plasma nitridation process is performed on a substrate, not on a dielectric layer. In Okuno, as a result of the plasma nitridation process, nitride layer 18 (e.g. a dielectric layer) is formed in an area of substrate 10 that was uncovered, while no dielectric layer is formed in the covered area of substrate 10.

Thus, the plasma nitridation process in Okuno is not a dielectric conversion source as specified in independent claim 28, since the plasma nitridation process does not increase the first dielectric constant of a dielectric layer in a second area of the dielectric layer to a second dielectric constant, as specified in independent claim 28. Furthermore, Okuno fails to teach, disclose, or remotely suggest exposing a second area in the dielectric layer to a dielectric conversion source so as to increase the first dielectric constant of the dielectric layer in the second area to a second dielectric constant, as specified in independent claim 28. Additionally, Okuno fails to teach, disclose, or suggest etching a plurality of capacitor trenches in the second area in the dielectric layer, which has been exposed to the dielectric conversion source, as specified in independent claim 28.

In contrast to the present invention as defined by independent claim 28, Liu does not teach, disclose, or suggest covering a first area of a dielectric layer, where the dielectric layer has a first dielectric constant, exposing a second area in the dielectric layer to a dielectric conversion source so as to increase the first dielectric constant of the

dielectric layer in the second area to a second dielectric constant, and etching a plurality of capacitor trenches in the second area in the dielectric layer. Liu is directed to creating an etch stop in an insulator to eliminate the need for deposition of the etch stop layer. See, for example, the Abstract of Liu. Liu specifically discloses depositing low dielectric constant material layer 52 over substrate 48 and curing low dielectric constant material layer 52 by electron beam irradiation or ion implantation to form hard mask or etch stop 53 in the topmost layer of low-k material layer 52. See, for example, column 6, lines 36-54 and Figures 4b and 4c of Liu.

However, Liu fails to teach, disclose, or suggest covering a first area of a dielectric layer having a first dielectric constant and exposing an uncovered second area of the dielectric layer to a dielectric conversion source such that the dielectric constant of the second area is increased from the first dielectric constant to a second dielectric constant, as specified in independent claim 28. In fact, Liu does not even teach increasing a dielectric constant of any area of a dielectric layer. Without the covering step of the present invention, both the first and second areas of the dielectric layer would have their dielectric constants increased. Furthermore, Liu fails to teach, disclose, or suggest etching a plurality of capacitor trenches in the second area in the dielectric layer (i.e. the area of the dielectric layer that has been exposed to a dielectric conversion source), as specified in independent claim 28. Therefore, Liu fails to teach, disclose, or suggest the present invention as defined by independent claim 28. As such, Liu fails to cure the basic deficiencies of Okuno discussed above. Thus, Applicants respectfully submit that the

combination of Okuno and Liu suggested by the Examiner does not and cannot result in the invention as specified in independent claim 28.

Moreover, Okuno teaches a process wherein a nitride layer is formed over a portion of a substrate to act as an oxidation retardant such that a thinner oxide layer can be formed underneath the nitride layer and a thicker oxide layer can be formed on a portion of the substrate not covered by the nitride layer. In contrast, Liu teaches a process for forming an etch stop layer on a low-k (i.e. low dielectric constant) material layer by curing the low-k material layer by electron beam irradiation or ion implantation. Thus, Applicants respectfully submit that insufficient motivation has been presented for one of ordinary skill in the art at the time the invention was made to modify the teaching of Okuno in accordance with the teaching of Liu as suggested by the Examiner.

For the foregoing reasons, Applicants respectfully submit that the present invention, as defined by independent claim 28, is not taught, disclosed, or suggested by Okuno and Liu, singly or in combination thereof. Thus, independent claim 28 is patentably distinguishable over Okuno and Liu. Independent claim 29 recites similar limitations as independent claim 28 discussed above. Thus, for the reasons discussed above, independent claim 29 is also patentably distinguishable over Okuno and Liu.

In contrast to the present invention as defined by independent claim 30, Okuno does not teach, disclose, or suggest covering a first area in a dielectric, where the dielectric has a first dielectric constant, exposing a second area in the dielectric to a dielectric conversion source so as to increase the first dielectric constant of the dielectric

in the second area to a second dielectric constant, where covering the first area in the dielectric prevents the first area from being exposed to the dielectric conversion source. As discussed above, Okuno fails to teach, disclose, or remotely suggest exposing a second area in a dielectric layer to a dielectric conversion source so as to increase the first dielectric constant of the dielectric layer in the second area to a second dielectric constant.

In contrast to the present invention as defined by independent claim 30, Liu does not teach, disclose, or suggest covering a first area in a dielectric, where the dielectric has a first dielectric constant, exposing a second area in the dielectric to a dielectric conversion source so as to increase the first dielectric constant of the dielectric in the second area to a second dielectric constant, where covering the first area in the dielectric prevents the first area from being exposed to the dielectric conversion source. As discussed above, Liu fails to teach, disclose, or suggest covering a first area of a dielectric layer having a first dielectric constant and exposing an uncovered second area of the dielectric layer to a dielectric conversion source such that the dielectric constant of the second area is increased from the first dielectric constant to a second dielectric constant. Thus, Liu fails to cure the basic deficiencies of Okuno discussed above.

Thus, the combination of Okuno and Liu suggested by the Examiner does not and cannot result in the invention as specified in independent claim 30. Furthermore, for similar reasons as discussed above, Applicants respectfully submit that insufficient motivation has been presented for one of ordinary skill in the art at the time the invention

was made to modify the teaching of Okuno in accordance with the teaching of Liu as suggested by the Examiner.

For the foregoing reasons, Applicants respectfully submit that the present invention, as defined by independent claim 30, is not taught, disclosed, or suggested by Okuno and Liu, singly or in combination thereof. Thus, independent claim 30 is patentably distinguishable over Okuno and Liu. Independent claim 31 recites similar limitations as independent claim 30 discussed above. Thus, for the reasons discussed above, independent claim 31 is also patentably distinguishable over Okuno and Liu.

B. Conclusion

Based on the foregoing reasons, the present invention, as defined by independent claims 28-31, is patentably distinguishable over the art cited by the Examiner. Thus, claims 28-31 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early Notice of Allowance for all claims 28-31 pending in the present application is respectfully requested.

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Respectfully Submitted,
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